

Demultiplexors

Lecture 23 Section B.3

Robb T. Koether

Hampden-Sydney College

Mon, Oct 28, 2019

1 Demultiplexors

- A 1:2 1-bit Demultiplexor
- A 1:4 1-bit Demultiplexor
- A 1:2 2-bit Demultiplexor

2 Building Bigger DEMUXs

1 Demultiplexors

- A 1:2 1-bit Demultiplexor
- A 1:4 1-bit Demultiplexor
- A 1:2 2-bit Demultiplexor

2 Building Bigger DEMUXs

Demultiplexors

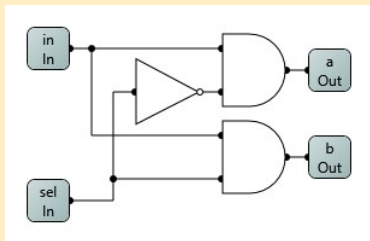
Definition (Demultiplexor)

A **demultiplexor** functions like a multiplexor except in reverse. It has an input, a select signal, and several outputs. The select signals determines to which output the input is directed.

- 1 Demultiplexors
 - A 1:2 1-bit Demultiplexor
 - A 1:4 1-bit Demultiplexor
 - A 1:2 2-bit Demultiplexor

- 2 Building Bigger DEMUXs

Demultiplexer



- The above demultiplexer selects sends the input to *A* if the control *S* is 0 and send it to *B* if the control *S* is 1.

Varieties of Demultiplexors

- As with multiplexors, there is a great variety of choices when designing a demultiplexor.
 - The number of outputs m (a power of 2).
 - The bit-width of each output n (a power of 2).
 - There is always only 1 input and its width is the same as the widths of the outputs.
 - The width of the select signal is $\log_2(m)$.
- We will label such a demultiplexor a "1: m n -bit" demultiplexor.
- For example, if there are 4 inputs, each with a width of 2 bits, then we have a 1:4 2-bit demultiplexor, which we will denote DEMUX 1:4 (2).

1 Demultiplexors

- A 1:2 1-bit Demultiplexor
- A 1:4 1-bit Demultiplexor
- A 1:2 2-bit Demultiplexor

2 Building Bigger DEMUXs

Demultiplexors

Example (4-Way Demultiplexor)

Design a 4-way multiplexor that will use two control signals S_0 and S_1 to select from among four output data signals A , B , C , and D .

- 00 will select A .
- 01 will select B .
- 10 will select C .
- 11 will select D .

Demultiplexors

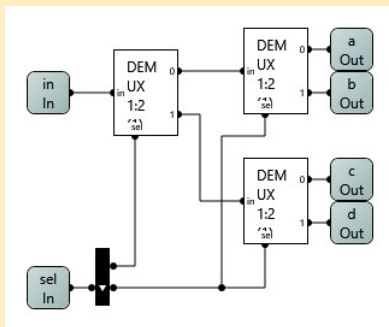
Example (4-Way Demultiplexor)

Design a 4-way multiplexor that will use two control signals S_0 and S_1 to select from among four output data signals A , B , C , and D .

- 00 will select A .
 - 01 will select B .
 - 10 will select C .
 - 11 will select D .
-
- How do we do it?

Demultiplexors

Demultiplexor



1 Demultiplexors

- A 1:2 1-bit Demultiplexor
- A 1:4 1-bit Demultiplexor
- A 1:2 2-bit Demultiplexor

2 Building Bigger DEMUXs

Example (2-Way 2-bit Demultiplexor)

Design a 2-way 2-bit demultiplexor that will use one control signals S to select between two 2-bit output signals A and B .

- 0 will select A .
- 1 will select B .

Example (2-Way 2-bit Demultiplexor)

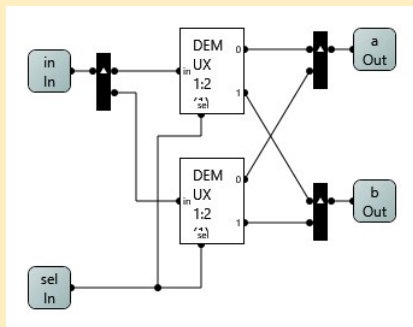
Design a 2-way 2-bit demultiplexor that will use one control signals S to select between two 2-bit output signals A and B .

- 0 will select A .
- 1 will select B .

- How do we do it?

A 1:2 2-bit Demultiplexor

1:2 2-bit Demultiplexor

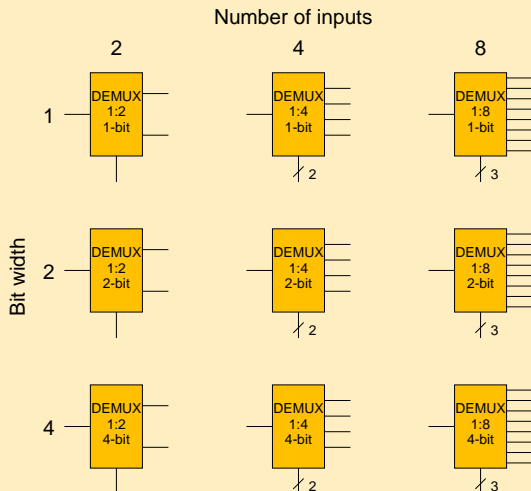


- 1 Demultiplexors
 - A 1:2 1-bit Demultiplexor
 - A 1:4 1-bit Demultiplexor
 - A 1:2 2-bit Demultiplexor

- 2 Building Bigger DEMUXs

Building Bigger DEMUXs

Building Bigger DEMUXs



Telephone System

Telephone System

